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Nat Hist

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HEADS

OF A

COURSE OF LECTURES

ON

Natural History

BY B. WATERHOUSE, M. D.

Approach and peruse the VOLUME of *the Creation* ; it is the language which has gone out to *all the ends of the earth*, unaffected by the confusion of *Babel*.

LORD BACON.

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HEADS

OF A COURSE OF LECTURES ON

NATURAL HISTORY.

I. **INTRODUCTORY.** *Curiosity*, or desire of knowledge, a certain sign of a vigorous intellect ; exemplified in the inhabitants of some parts of the United States, and of China. The importance of gratifying properly this “thirst of the soul” in young people. The grand object, or effort of education is to engage the mind by pleasure, while you fill it with instructive ideas. The outlines of the course before us. Who first suggested the natural history of our country.*

II. Opinions respecting the *creation of the world*. The sum total of matter now, the same as at the first creation. Concerning the **PRIMARY MATTER**, or that original *fund*, which is constantly changing *out of*, and *into* all the various substances perceivable by the senses. The production of a vegetable, and every other organized body, not a fresh creation, or calling of something out of *nothing* ; but a *mutation*, or change

* See the constitution of the commonwealth of Massachusetts, chap. v. sect. 2.

of something that before existed. This doctrine illustrated. “*Omnia ex ovo.*”

III. Concerning *simple matter*, and its astonishing *divisibility*, especially in animal bodies. Matter cannot move itself. Of that *original power*, which causes weight ; and that which causes heat ; or *gravitation* and *expansion*. Of chemical attractions, and of *caloric*, or the fluid matter of heat. Of *light*. “Organization, sensation, and spontaneous motion exist only in places exposed to the influence of light.” Of the fable of *Prometheus*.

IV. Concerning the **EFFICIENT CAUSE**, or that spirit, or principle of motion, which throws into shape and actuates the otherwise lifeless matter. Concerning the elements of *fire*, *water*, and *air*. How far they may be considered as *elements*. By that term we mean to express the last point, which analysis is capable of reaching. Of that spirit, which moved upon the face of the water,

“On wings outstretch’d, o’er chaos hung sublime.”

V. Distribution of knowledge into particular sciences. Philosophy divides itself into the doctrine of the **DEITY**, of *Man*, and of *Nature*. What is meant by the *Great Book of Nature* ; the art of reading it. The Science of Natural History comprehends two objects ; first, that of discovering, naming, and systematizing the all various productions of nature ; this is dry, mechanical and incomplete ; secondly, that of relating the properties, manners, and relations which they bear to man, and to each other ; this is useful knowledge, widening the prospect of nature around us, and giving us a relish for existence. Both neces-

sary to form the consummate naturalist. METHOD the soul of science ; by it a confused heap of facts may be so arranged that the judgment may perform its office with advantage. A caution not to mistake classification for Natural History ; or to pursue it so far as to loose sight of nature.

VI. Concerning the transition from inert to organized matter ;* and from a vegetable to the lowest order of animated nature, viz. the Zoophytes ; or that order of beings which connects insensible to animated nature. As every animal in nature came from an egg, so every vegetable springs from a seed. Of molecules, or organized particles *susceptible* of life. The general doctrine of a *vegetable*. The anatomy of a seed ; demonstrated to be an organized body, furnished with vessels like an animal, and containing the future plant in miniature. Of the successive changes a seed undergoes when placed in a due degree of heat and moisture. Of the oxygenating process in the growing plant, and the evolving egg. How the molecules, or infinitessimally small organized bodies are absorbed by a vegetable in the *act* of growing.

VII. BOTANY. Anatomical description of a full grown vegetable ; of the *seven* essential parts of it, discoverable in the seed, root, stem, branch, leaf, bud, flower and fruit. A biographical sketch of LINNÆUS, the prince of naturalists.

VIII. The *Linnæan system of Botany* briefly explained, a system encumbered with fewer difficulties than any hitherto published. Of the *private* and *pub-*

* The *Monas* : Vermis inconspicuus, simplicissimus, pellucidus, punctiformis. An invisible, pellucid, simple, punctiform worm ; or a live, jelly-like point. See Adams 430.

lic virtues of vegetables ; or of their specific virtues ; and of the power which the collective body of vegetables possesses in purifying the atmosphere. Of the pernicious effects of sleeping in a small room crowded with flowers or fruit. How every vegetable, from the tall pine and stately oak of the forest, to the humble grass of the field, contributes to form one *grand apparatus* for cleansing the atmosphere from pernicious exhalations.

IX. On the noble and honorable art of *Agriculture*. Agriculture gives man the only riches he can call his own. The advantages of *Labour* : It is a task kindly imposed on man by his beneficent CREATOR, as the best means of preserving his *health*, his *safety*, and his *innocence*. By agriculture only can *Commerce* be perpetuated. Of the food of plants. Does the food of plants reside in *water* alone ? or in *air* ? or in putrid animal substances ? or in a combination of all three ? Of the different kinds of soil ; and of the manures adapted to each : some of directly opposite qualities to others. Of that unceasing rotation between the growth and decay of vegetables, and the vitality of animals, by which circulation life is kept up, without a pause, throughout every part of the creation.

X. Directions how to form a *Hortus Siccus*. Importance of the *art of drawing* to every man of education, especially to the Naturalist. Of the easy multiplication of drawings by the simple art of *etching*. Examples. The *art of printing* ; or the ARS ARTIUM OMNIUM CONSERVATRIX. A digression, whether Science, Morality, or Liberty have, or will be gainers by this discovery. *Gesner* and *Aldrovondus* celebrat-

ed and lamented ! What is the ultimate end or use of Botany ? All the public Professors of Botany, in every period of its existence as a science, have been *medical* men.

XI. The *Animal Kingdom*. The difficulty of drawing exactly the line between the vegetable and animal kingdom. Do they in fact divide themselves into two distinct kingdoms ? or do they form only one immense family ? As all vegetables come from a seed, so every animal comes from an egg. The anatomical description of an hen's egg. *Heat*, an exciting and preserving stimulus, necessary to begin and to support animal life. The gradual unfolding of the chicken, from the first hour of incubation, till it breaks its shell and shews itself an active animal in the open air. This process applied to the primordia of *all* other animals in creation.* Of Respiration in man and other quadrupeds.

XII. ORNITHOLOGY, or the doctrine of *Birds*. As, in the descending scale of nature, quadrupeds follow after man, so birds follow after quadrupeds. The difference between the internal structure of birds and quadrupeds. How air penetrates every part of their bodies, even their bones, while their lungs are nearly quiescent. The difference between their digestive organs and man's. The curious structure of a *feather*. Of *moulting*. Nothing in nature so strong, so forcible, and so *light*, as the wings of birds. Why man must ever despair of flying with feathered wings. The

* These subjects will be extended, contracted, or entirely omitted, according to the audience. To an audience of medical men they may be extended ; to a mixed company of gentlemen contracted, or entirely omitted.

flying of a *bat* on different principles from that of birds. Of the eyes, and surprising sharpness of sight in birds : their eyes nearly as large as their brains. General character of the rapacious class of birds. Of the instinct of birds.

XIII. AMPHIBIOLOGY ; or the doctrine of that class of animals which live sometimes in the water ; have hearts with a single auricle and ventricle ; cold red blood ; a third part of which only passes through their lungs ; with cartilages instead of bones. Divided into *Reptiles*, under which is found the *turtle*, *frog*, and *lizard* tribe : the *Serpentes* : and *Nantes*. Miscellaneous observations.

XIV. ICHTHYOLOGY ; or the doctrine of *Fishes* ; a class of animals living entirely in the water, and having lungs in their heads ; and a *vesica aëria*, or swimming bladder in their bodies. Miscellaneous observations. Fishes the eldest children of creation ?

XV. INSECTS. Smallness does not constitute an insect. Definition. Their curious structure, exemplified in the caterpillar. Can live the longest when deprived of those organs deemed vital in the higher order of animals. Their amazing number ; more numerous than vegetables ; a proof of their imperfection. The Microscope operates like enchantment, by calling up to view the invisible world, totally unknown to the ancients. Insects the most captivating branch of Natural History ; “ *vidi et obstupui* ;” but the least useful. Among such an innumerable host, the *silk-worm*, the *bee*, the *cantharid*, and the *cochineal* are nearly all that are useful to man. The VERMES, placed between Insects and Plants. They are the very out-

skirts of animated nature, extending to the confines of the vegetable world. On Instinct.

XVI. On the SCALE of BEINGS. 1. Of inorganized beings, as a *mineral*: 2. organized and inanimate beings, as a *plant*: 3. organized and animate beings, as the *brute animal*: 4. organized, animate, and reasonable beings, of which there is but one on earth, viz. MAN. Of the *faculties* of organized bodies: (a) of the *nutritive* faculty; (b) the *vegetative*; (c) the *sensitive*; and (d) the *rational*. Does the reflective faculty belong only to man? Can we exclude the *dog*, the *beaver*, or the *elephant*? Of the *Æconomy* of organized bodies. The animal produced by a cutting, as in the polypus, is but one degree above a vegetable; that produced from an egg [oviparous] is one step higher; that class of animals which is brought forth alive [viviparous] still more exalted; of these such as bring forth one at a time the most complete, the foremost of which stands the great master of all, MAN. *Man* placed on the top of the visible series of creation; and uniting in himself all the powers and faculties of nature; hence called the *microcosmos*. Does the scale end where it ceases to be visible? The opinion of *Locke*, *Addison*, and *Jennings*.

XVII. The *Doctrine* of MAN comprised under six heads. The 1st considers him Physiologicè; 2. Diæticè; 3. Pathologicè; 4. Naturaliter; 5. Politicè, and 6. Theologicè:—" *Hæc si noveris Homo es, et a reliquis animalibus distinctissimum genus.*" LIN. The human body unites all the powers and faculties of nature; it is the masterpiece of creation.

Instinct, a propensity prior to experience and independent of instruction ; directs the animal creation to choose what is good for food, and to avoid what would be destructive ; but man, blessed with reason, feeds on every thing, and varies it infinitely by that art of cookery. Of the *Vis Medicatrix Naturæ*, or that innate power which the human body possesses of curing itself when diseased. Man in his savage state ; in his civilized state ; and lastly as distinguished from all other animals by a knowledge of his Creator.

XVIII. MAN distinguished from all other animals by the expression of his feelings, as in *laughing* and *shedding tears*. In all animals whose individuals rise little above the rest of their species, knowledge is instinctive ; in man, whose individuals are so widely different, it is acquired by *education*. Is the difference in the minds of men so much the effect of education, as *organization* ? The skull of a negro, an Asiatic, an European and American compared. Of the *Animal Economy* ; or that *innate* power which conducts man from helpless infancy to his full growth ; a power which ceases not its operation while sense and appetite are asleep ; being the power that nourishes, refreshes, and animates him, and which causes him to sleep and to wake. A distinction between this innate power and that of the MIND ; or the *power* of thinking, reflecting, comparing, and representing to itself past, present, and to come ; which power is termed comprehension, understanding, reason, mind, will, freedom, or collectively by the single word SOUL. The

opinions of certain antient and modern philosophers on the locality of the soul.

XIX. MAN, of all earthly beings, alone possesses the power of *contemplation*: He alone is capable of surveying the universe, and of elevating his mind to the Almighty hand that directs the whole : exemplified in a VIEW OF THE SOLAR SYSTEM ; the prospect so astonishing as ultimately to oppress the mind by undiscerning amazement ! The SUN the great source of *heat, light, life, and joy* to the globes circulating around him. General description of one of these bodies, viz. the TERRAQUEOUS GLOBE, which we inhabit. The Solar system so perfect that nothing can be mended or altered for the better ; not so the EARTH, where man heightens his enjoyment by mending his habitation. This *mending* the earth is the *noble art of agriculture*, whence emerges *commerce* with its long train of benefits. *Commerce* binds the world together in a *golden chain*.

XX. Of the most celebrated theories of the formation and present state of the earth, viz. *Burnet's, Woodward's, Whiston's, Buffon's* and *Hutton's*. Of the formation and use of *mountains*, and the origin and use of *rivers*.

XXI. The *Crust* of the earth described ; the knowledge of which constitutes the science of MINERALOGY. The contents of the earth but little known : all below 3000 feet is dark conjecture. Of the structure of *primæval*, and of *alluvial* mountains. The history of MINERALOGY ; of the collection of *minerals* in the

University of CAMBRIDGE ; its origin, progress and present condition.

XXII. Of the *Primary Earths*. Characteristic properties of *ores*. Definition of a metal. What some mean by *Phlogiston*, or fire clothed with a body ? Of *Platina*, *Gold*, and *Quicksilver*, or *perfect* metals ; so called because they suffer no oxydation in the furnace. Of *Silver*, *Copper*, *Iron*, *Lead*, *Tin* and *Zinc*. Of the *Semi metals*. The UNITED STATES replete with minerals ; yet are we dependent on foreign nations for riches that lie under our feet ! Better for us to find mines of *Tin* than *Gold*. The scarcity of the last augments its value. The *extravagant* price set on diamonds, and other glittering stones, ridiculous in the eyes of Americans. “ *Quot manus atteruntur, ut unus niteat articulus !*” Pliny.

XXIII. *The Natural History of WATER*. Water enters the composition of *every* vegetable, mineral and animal. Whence do Rivers derive their *unceasing* supply ? Of the *perpetual* circulation of *fresh* water from the *salt* Ocean, through the atmosphere, down the Mountains, and, in the form of Rivers, to the Ocean again ; all having a special reference to the sustentation of vegetables ; which afford, directly, or indirectly, nutriment to all *terrestrial* animals.* The Natural History of the *Atmosphere*, a desideratum. Is the *Air* the offspring, or expiration of *Water* ; and *Fire* of *Air* ? The opinions of some of the ancients, especially of *Thales*. “ *All things out of water.*” The subject of *Agriculture* and *Com-*

* *Terrestrial* is here used in contradistinction to *submarine*.

merce resumed. Commerce the best cure for local prejudices.

XXIV. Of the art of reading the *Great Volume of Nature*. How the antient *Magi* construed it. The analogy between things *material* and *intellectual*; or an attempt to shew that the material world is a mirror, reflecting moral truths.

XXV. The French "*System de la Nature*," opposed by arguments drawn from *Newton*, *Clarke*, *Butler*, *Voltaire*, and the *common sense* of mankind.

XXVI. After all the struggles of a reluctant philosophy, the necessary resort is to a DEITY. The marks of *Design* are too strong to be got over. Design must have had a *Designer*. That there is a GOD, a perceiving, intelligent, designing *Being*, at the head of creation, and from whose will it all proceeded, is nevertheless an IMMENSE CONCLUSION.*

* Paley.



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